

STABLE COSMETIC EMULSION WITH POLYAMIDE GELLING AGENT

Field of the Invention

[0001] The invention relates to a cosmetic and personal care gel product that is gelled using a polyamide as a gelling agent in the oil phase. More specifically, the invention relates to a stable emulsion based compositions comprising a polyamide gelling agent in the oil phase.

Background of the Invention

[0002] Many gelled cosmetic emulsions rely on gellants, waxes, fillers, heavy oils, and plasticizers for developing the structure to make a gel or stick composition. The structure built by these agents and materials give the product a balance of rigidity and firmness depending on the desired product. For example, the structure of lipstick is traditionally formed by a blend of wax and oil. However, these adjuvants, particularly waxes, have a disadvantage in that they contribute to opacity which diminishes the color of the pigment. The product therefore, has a dull, lackluster and pale appearance. To overcome this problem, enhanced amounts of pigment are added to the composition. Another drawback to the addition of wax is that it adheres poorly to the skin and compromises the longevity of wear of the product. For example, many commonly used cosmetic products, such as foundation, concealer, eyeliner, and lipstick, which contain these materials, are subject to fading, smudging, and flaking. Such products also have a matte appearance that is not always desirable. In addition, other adjuvants such as heavy oils can feel uncomfortable on the skin and have a distinct oily feel that may also be unpleasant. Therefore, to address these issues, alternative gelling agents have been sought and specific polyamides have been used to gel cosmetic products.

[0003] The use of polyamides in cosmetic products has been known. For example, polyamide resins have been used in an anhydrous lipstick as disclosed in U.S. Patent No. 3,148,125. The method of making polyamides is disclosed in, for example, U.S. Patent No. 2,450,940. The polyamide resin has also been used in a deodorant or antiperspirant gel or stick as disclosed in U.S. Patent Nos. 4,275,054 and 5,500,209 because of its odor absorbing properties. None of these references, however, discloses an emulsion gelled with the non-siloxane based polyamide in combination with an ethylene oxide containing emulsion stabilizer. The stick, soft gel, or clear gel compositions disclosed in, for example, U.S. Patent Nos. 6,051,216, 5,603,925, and 5,998,570 and

European Patent Application Nos. EP 1 068 855 and EP 1 068 856 are unstable emulsions, single phase compositions, or use a siloxane based polyamide. The siloxane polyamides have been developed because of their alleged ability to, in addition to gel the composition, provide a less tacky composition. However, the siloxane based polyamides are not compatible with a wide variety of oils, for example, hydrocarbon oils, and because they are less tacky, their adhesion properties are significantly impaired, making them less desirable in products that require minimally an initial phase of adhesion during the application of the product to the skin or hair. Therefore, it is desirable to use other polyamides in cosmetic emulsion systems because products such as mascara, for example, need a certain degree of tackiness when being applied but afterwards, upon drying the tackiness of the mascara needs to transition to a comfortable feel on the lashes. Until now, it has not been known to fine-tune the tacky nature of a cosmetic dual phase product containing the polyamide resin as a gelling agent. The compositions heretofore have either been too tacky or not tacky enough for products that need to exhibit varying degrees of tackiness over time and during their use. Thus, the emulsions of the present invention gelled with a non-siloxane polyamide has heretofore not been known. A need for a stable cosmetic emulsion gelled by a polyamide resin system that adheres to the skin and functions in a variety of cosmetic emulsion systems still remains. The emulsion system of the present invention is also desirable because it allows water-soluble ingredients to be incorporated into the product containing the emulsion.

Summary of the Invention

[0004] The invention relates to gelled cosmetic compositions, and specifically, oil-in-water or water-in-oil emulsions, which comprises at least one alkylene oxide containing emulsion stabilizer and at least one non-siloxane based polyamide resin. The prepared emulsions, while they are not themselves clear, are substantially transparent after application to the skin. Use of the polyamide resin as a gelling agent *per se* is not new, however, its incorporation into the color compositions of the present invention containing the C₁₋₅ alkylene oxide, for example, ethylene oxide or propylene oxide, as an emulsion stabilizer is surprising. The cosmetic emulsions of the present invention also comprise a color component present in an amount greater than about 2.0 percent by weight of the composition. The ability to gel a color cosmetic emulsion with the polyamide resin as the primary gelling agent is particularly challenging because the polyamide is very polar and emulsions containing large quantities of polyamide tend to be tacky and are difficult to stabilize in the presence of colorants.

[0005] The present invention also includes methods of making the emulsion systems of the present invention which can include multiple emulsion systems. The emulsion products are especially transparent and transfer resistant when they are applied to the skin and allowed to dry. The compositions containing these emulsions have an enhanced brightness and clarity with respect to their color on the skin after application thereon due to the transparent film that adheres to the skin without being tacky. The emulsion systems of the present invention dry faster than other polyamide containing systems, and are long wearing even after the water evaporates. In addition, gels and sticks made with the emulsion system of the present invention are less brittle, experience a substantial lack of syneresis, and have a creamier texture because the three-dimensional structure formed by the polyamide resin is interrupted partially by the water phase.

Detailed Description of the Invention

[0006] The gelling system of the present invention is at least one non-siloxane based polyamide resin and at least one C_{1-5} alkylene oxide containing emulsion stabilizer. The polyamide resin as used herein is defined to be a polymer having recurring units of amide groups as an integral part of the main chain of the polymer and a terminal end group of acid, amine, or ester. The polyamide gelling agent can be used to produce a soft gel or a stick composition in an emulsified system. Therefore, it is preferable that the polyamide resin not be extensively cross-linked by hydrogen bonds. The polyamides are characterized as thermoplastics as opposed to thermosets. Based on complex fatty acids, esters, and amines, the polyamides used in the present invention are water insoluble. The polyamide is available in a solid form of 100 percent polyamide or as a percentage of polyamide in mineral oil, usually about 80 percent. Examples of commercially available polyamides which are useful in the present invention are Versamid 1655, by Cognis (formerly Henkel Corporation), Ambler, PA which is prepared from dimers of C_{18} unsaturated fatty acids which are partially hydrogenated, azelaic acid (nonanedioic acid), ethylene diamine, hexamethylene diamine and stearic acid, Unirez and Uniclear, a series of polyamides from Arizona Chemicals Corporation, Jacksonville, FL or Elvamide from DuPont, DE a terpolymer of nylon 6, nylon 66, and nylon 610. Additional polyamides are disclosed in U.S. Patent Nos. 4,820,765, 5,719,255, 5,807,968, 6,111,055, and 6,054,517, the contents of which are incorporated herein by reference. These references fail to recognize the ability to make a stable emulsion product, and thus, fail to recognize the benefits of a water containing cosmetic emulsion incorporating a polyamide gelling agent and an C_{1-5} alkylene oxide containing surfactant. For

example, U.S. Patent No. 5,783,657 is an anhydrous system, and U.S. Patent No. 5,998,570 discloses that water is preferably removed when forming the polyamide, and compositions comprise a nonaqueous liquid as solvent, preferably a low-polarity liquid.

[0007] The water phase of the cosmetic emulsion of the present invention comprises about 0.05 to 90.0 percent, and preferably 1.0 to 70.0 percent by weight of the emulsions. While the water phase is primarily water, it can take the form of a variety of aqueous solutions such as rose water, tea, and the like. Therefore, the water phase is well suited to deliver water-soluble actives and other water dispersible agents, such as for example, film-formers, surfactants, and emollients. The non-aqueous phase can include any type of cosmetically acceptable volatile or non-volatile oil including oily esters depending on the application of the product and the degree of gelling desired. Examples include, but are not limited to, hydrocarbon oil such as isododecane, silicone oils such as cyclomethicone, polyorganosiloxanes such as phenyl-methicones and dimethicones, castor oil, and hydrogenated vegetable oil. Preferably, in a mascara, the oil is volatile, such as for example, a volatile hydrocarbon oil or silicone oil; while a lipstick is a mixture of both volatile and non-volatile oils and the amounts of each depends on the type of lipstick desired. Suitable non-volatile hydrocarbons include, but are not limited, to isoparaffins, squalane, or petrolatum, or mixtures thereof. Regardless of the amount of volatile and/or non-volatile oil, the entire oil phase is present in an amount of about 5 to about 95 percent, preferably 10 to 80 percent by weight of the composition, and more preferably about 10 to 40 percent.

[0008] The emulsions of the present invention are prepared by adding a gelling sufficient amount of the polyamide resin to the oil phase. The amount of polyamide resin used in the present invention is from about 1 to about 90 percent, preferably about 2 to 40 percent by weight of the composition. The amount of polyamide is a "gelling sufficient amount" and as used herein means an amount of polyamide in the oil phase to bring about an increase in the viscosity of the emulsion; preferably the viscosity increases by 25 percent, more preferably by 50 percent, and most preferably by 75 percent. This increase in viscosity is sufficient to form a thickened gel or form a solid having the hardness of a stick as the thickness of gels and sticks are known in the art. At lower levels, the polyamide aids in forming a gel, whereas, higher levels are used to make stick products. Although it is difficult to quantitatively distinguish between a cosmetic gel and stick, a gel is, in general, more viscous than a liquid; but, it is not as rigid or self-supporting as a stick. It is accepted by one of ordinary skill in the art that a gel maintains a certain degree of deformity, whereas, the stick is free-standing and is substantially rigid.

[0009] Another component of the present invention is the C₁₋₅ alkylene oxide containing emulsion stabilizer. Preferably, the emulsion stabilizer is an ethylene oxide or propylene oxide. It is surprisingly discovered with the present invention that a stable emulsion comprising the polyamide resin as the gelling agent can be achieved. Although, it is known to gel alcoholic based systems and oil based systems with the polyamide resin, until now, these systems have primarily been single phase. In particular, stable dual phase compositions, and especially, stable cosmetic emulsions, have not been known to contain a non-siloxane based polyamide gelling agent as they experience stability problems. The non-siloxane based polyamides are known to be tacky. Therefore, their use is limited and most appropriate for coatings, paints, inks, epoxies, adhesives and the like. Their use in cosmetics has also been limited primarily to single phase systems such as anhydrous lipsticks and deodorants. However, the ability to formulate these types of cosmetics is quite different than the challenges presented by formulating a cosmetic emulsion, especially a stable emulsion in a color cosmetic.

[00010] The method of preparing the emulsions of the present invention entails basic steps known in the art for preparing emulsions. The non-siloxane based polyamide and the other ingredients in the oil phase may be prepared separately but are combined or added to the oil phase before combining with the aqueous phase to make the emulsion. The present emulsions, containing the gelling system, can be prepared with the polyamide as the primary gelling agent in the gelling system or with other naturally derived or synthetic gellants or thickening agents, known and commonly used by one skilled in the art, such as for example, cetyl dimethicone copolyol, acrylates copolymer, dextrin fatty acid esters, carbopols, dibenzyl monosorbitol acetal, polyethylene wax, beeswax, carnauba wax, candilla wax, bayberry wax, rice wax, acylglutamic acid diamide, esters, fatty alcohols, and the like can be used in the oil phase of the present invention. Preferably, however, the compositions of the present invention are wax-free.

[00011] Surprisingly, it has been found that the presence of an ethylene oxide containing surfactant stabilizes the emulsion system containing the polyamide as the gelling agent. The ethylene oxide containing surfactant is known to be temperature sensitive, and therefore, when used in emulsions, experiences stability problems. Considering the difficulty of formulating a cosmetic emulsion, and in addition, the difficulty of incorporating the non-siloxane polyamide gelling agent in the emulsion, it is surprising that greater stability is achieved using the ethylene oxide containing emulsifier. While not wishing to be bound to any particular theory, it is believed that stability and enhanced gelling is achieved with the ethylene oxide containing emulsifier because it is capable of

hydrogen bonding with the polyamide gelling agent. The emulsion stabilizer can be a single surfactant or a combination of surfactants. The emulsion stabilizers aid in rendering the polyamide resin compatible in the dual phase system, and enhance not only the stability of the emulsion containing the non-siloxane based polyamide resin as the gelling agent, but may also affect the gelling activity of the polyamide resin. Because the polyamide resin is water-insoluble when used as a gelling agent in the emulsion, stability problems are known to arise. In particular, agglomeration occurs or the phases separate in a short time, for example, in about few hours to about a few months. However, the present invention has discovered that this problem can be remedied with the emulsion stabilizer which can be present in the oil phase, the water phase, or both. As a result, the polyamide resin is rendered compatible in the emulsion stabilizer at room temperature and/or at elevated temperature. In addition, the emulsion is stable for about 6 months, preferably about 1 year, and more preferably about two years as measured by accelerated stability testing methods, known to one of ordinary skill in the art.

[00012] More preferably, the emulsion stabilizer of the present invention is primarily ethylene oxide containing surfactants, ethoxylated alcohols, and emulsifiers such as polyethylene glycol esters. Specifically, the emulsion stabilizer can be cetyl dimethicone copolyol/polyglyceryl-4 isostearate/hexyl laurate, PEG-30 dipolyhydroxystearate, sorbitan tristearate, glyceryl stearate/PEG-100 stearate, glyceryl olivate, polysorbate 20, stearic acid, or laureth-7. Examples of solvents, include but are not limited to, emollients such as low polarity liquid emollients, straight chain and branched fatty alcohols, cetyl alcohol and isocetyl alcohol, monohydric or polyhydric alcohols, such as propylene glycol and dipropylene glycol, fatty acid esters, such as cetyl acetate/acetylated lanolin alcohol.

[00013] In yet another embodiment, the emulsion is stabilized by the addition of nitrogen containing soap-based emulsifiers, or alkanolamides of fatty acids, preferably, lauramide MEA or stearamide MEA, and derivatives thereof. The lipstick containing, for example, lauramide MEA (monoethanolamine), is particularly effective in providing stability against the development of syneresis even when the lipstick is in the form of a water-in-oil emulsion.

[00014] Other features of the emulsions of the present invention include their substantial transparency when applied to the skin, good adherence to the skin without being tacky, and their substantial transfer resistance. The emulsions can be wax-free because the need to build structure with large amounts of wax is eliminated by the presence of the polyamide gelling agent. The use of the polyamide gelling agent in the presence of the water phase of an emulsion system is an

pigments and azo-type red pigments such as naphthol red pigment. Other suitable aromatic pigment compounds include, but are not limited to, azo, triphenyl methane, indigo, anthraquinone, and xanthine dyes which are referred to as D&C, and FD&C pigments, such as for example, FD&C blue No.1, FD&C green No. 5, FD&C red No. 40, and FD&C yellow No. 5. Also useful are lakes which are pigments formed by the precipitation and absorption of organic dyes in an insoluble base, such as alumina, barium, or calcium hydrates. Particularly preferred lakes are primary FD&C or D&C Lakes and blends thereof. Colorant concentrations will vary depending upon the desired color or tint of the cosmetic product, but the colorant component generally will be greater than 2.0 percent, and preferably, greater than 5.0 percent by weight of the total composition.

[00017] The colorant can also be an inorganic pigment. The inorganic pigment is present in low amounts and preferably, the inorganic pigment has a small particle size, for example, a submicron particle size that will disperse and permit the cosmetic product to maintain a clear appearance. Examples of inorganic pigments include, but are not limited to, iron oxides (yellow, red, brown or black), ultramarines, chromium hydroxide green, chromium oxide, titanium dioxide (white), ferric ferrocyanide, ferric ammonium ferrocyanide, and mixtures thereof. The pigments can be ground by, for example, a rolling mill, or alternatively, the pigments can be purchased pre-ground in a blend containing, for example, water, polysaccharides, and black iron oxide. The ability to incorporate dyes, pigments and colorants is challenging in an emulsion system, especially one that contains the non-siloxane based polyamide as the gelling agent, and the ethylene oxide containing emulsion stabilizer. However, surprisingly, the color of the cosmetic emulsions of the present invention, after application to the skin, provides maximum color impact. The color is deep, brilliant and crisp.

[00018] The active ingredients incorporated in the emulsions of the present invention having a polyamide as the gelling agent preferably do not include antiperspirant actives especially those that are acidic metal salts. Examples of actives that can be used in the present invention include, but are not limited to, sunscreen actives, whitening agents, such as for example, antioxidants, antimicrobials, analgesics, anesthetics, anti-acne agents, antidermatitis agents, antipruritic agents, anti-inflammatory agents, antihyperkeratolytic agents, anti-dry skin agents, antipsoriatic agents, antiseborrheic agents, antiaging agents, antiwrinkle agents, self-tanning agents, wound-healing agents, corticosteroids, or hormones. The incorporation of the active in the formulation is determined by its solubility and/or stability in combination with non-siloxane polyamide gelled emulsions of the present invention. The term "sunscreen" as used herein refers to any material

which is capable of protecting skin from ultraviolet radiation having a wavelength of from about 280 to about 400 nm, by effectively absorbing such radiation, and/or reflecting or scattering such radiation away from the surface of skin. Examples of sunscreens with which the compositions of the present invention can be combined in this context are titanium dioxide, zinc oxide, benzophenones, octyl dimethyl PABA, amyldimethyl PABA, octyl methoxycinnamate, 2-ethoxy p-methoxycinnamate, oxybenzone, homosalate, phenyl salicylate, avobenzene, glyceryl p-aminobenzoate, ethyl-p-glycosylimido benzoate and the like. In a formulation, the sunscreen agent is used in the amounts normally used for that agent. Preferably, the active is non-acidic. The selection of the mode of delivery for additional active ingredients, however, is limited to the mode of delivery chosen for the compositions.

[00019] The cosmetic product can be, but is not limited to, a lipstick, lip gloss or other lip product, a solid, or gel fragrance or perfume product, cleanser, toner, an eye product, such as a mascara, eyeliner or an eye gel, compact emulsion foundation, concealer, moisturizing skin lotion or cream, hair stick or gel, and any other makeup, or skin or sun care product that is in a gel or stick form. In a preferred embodiment, the product is a mascara or lipstick product. The base of the lipstick or mascara has sufficient clarity such that the color is bright and luminous, i.e., they are transparent, semi-transparent, or translucent. The products of the present invention are long wearing, non-smudging, and non-flaking.

[00020] Further, the clear cosmetic product can contain other optional components as long as they do not interfere with the gelling properties of the polyamide. Examples include, but are not limited to, one or more preservatives such as, for example, propyl paraben, butyl paraben, mixtures thereof, or isoforms thereof, as well as butyl hydroxy toluene or butyl hydroxy anisol (BHT or BHA); fragrances (such as pinene); flavoring agents; waterproofing agents (such as PVP/eicosene copolymer); surfactants, such as silicone copolyols or fatty acid glycerol esters; and oil-soluble actives, such as tocopherol and its derivatives or retinol and its derivatives; and the like.

[00021] The invention is further illustrated by the following non-limiting examples.

EXAMPLES

I. Lipstick with Polyamide Gelling Agent

<u>Material</u>	<u>Weight %</u>
<u>Phase I</u>	
Polyamide resin	18.0
Isocetyl alcohol	22.0
Stearyl alcohol	4.0
Lauramide MEA	3.0
Propylene carbonate	3.8
Laureth-7	4.0
Isopropyl alcohol	2.0
Glycerin	3.0
Cyclomethicone	4.0
Acrylates copolymer	0.2
Cetyl dimethicone	
copolyol/Polyglyceryl-4	
isostearate/Hexyl laurate	2.0
<u>Phase II</u>	
Dimethicone	1.0
Castor oil	4.0
Hydrogenated vegetable oil	0.8
Iron oxide	0.6
FD&C Blue #1	0.3
FD&C Yellow #5	1.0
Bismuth oxychloride	4.0
Mica/Titanium	
Dioxide/Carmine/Methicone	0.9
D&C Red #7	3.0
<u>Phase III</u>	
Water	18.5

[00022] The lipstick is prepared by combining Phase I ingredients together and heating them to about 99°C for about 2 hours. Phase II ingredients are combined and ground in a homogenizer at about 3000 rpm for about 10 minutes. The homogenized Phase II ingredients are added to Phase I and together the combination is heated to 80°C. Phase III is added to the combined Phase I and Phase II ingredients at a temperature of about 80°C by mixing. Adjust pH of combination with to about 7.35. The lipstick can be made by pouring the combination into a lipstick mold or by following any known technique for making a lipstick.

II. Oil in Water Mascara with Polyamide Gelling Agent

Material	Weight %
<u>Phase I</u>	
Polyamide resin	10.00
Sorbitan Tristearate	1.00
Glyceryl Stearate/PEG-100 Stearate	1.00
Stearic Acid	4.00
Diethyl Adipate/Octyl Stearate/Octyl Palmitate	1.00
Stearamide MEA Stearate	3.00
<u>Phase II</u>	
Dimethicone	2.50
Cyclomethicone	5.00
Isododecane	11.00
Ethanol	0.50
<u>Phase III</u>	
Water	22.50
Silica	1.00
Polysorbate 20	2.00
Acacia Gum	0.25
<u>Phase IV</u>	
Water	10.45
Black iron oxide	8.00
Polyvinylpyrrolidone	1.00
<u>Phase V</u>	
Water	8.00
Shellac	2.00
Acrylic copolymer	5.00
Preservatives	0.80

[00023] Combine Phase I ingredients and heat to about 90°C until solids are melted. Add Phase II ingredients to Phase I ingredients and maintain heat at about 60°C. Heat Phase III ingredients to about 60°C and combine with Phase IV ingredients. Add combined Phase III and IV ingredients to Phase I and II ingredients by mixing. Add Phase V ingredients to the mixture and adjust pH to about 7.35. The mascara is tested for stability by storing the mascara at 50°C. Accelerated stability data is measured using a Brookfield rheometer. An initial viscosity measurement is 49.5. Six-week viscosity measurement is 45.0 and predicts stability up to about 2 years.

III. Water in Oil Mascara with Polyamide Gelling Agent

<u>Material</u>	<u>Weight %</u>
<u>Phase I</u>	
Polyamide resin	12.0
PEG-30 Dipolyhydroxystearate	3.0
Cetyl acetate/Acetylated lanolin alcohol	1.0
Stearic acid	3.0
Isododecane	20.0
<u>Phase II</u>	
Black iron oxide	10.0
Ethanol	3.0
Glyceryl olivate	0.5
Isododecane	18.0
<u>Phase III</u>	
Acrylic copolymer	7.0
Dioctyl malate	1.0
<u>Phase IV</u>	
Water	21.5

[00024] Add ingredients of Phase I together and heat to about 99°C for about 2 hours. Combine Phase II ingredients and grind them in a Silverson at about 3000 rpm for about 10 minutes. Mix Phases I and II together, and add Phase III ingredients with a mixer at a temperature of about 80°C. Add phase IV ingredients to Phases I, II and III ingredients at about 80°C by mixing and adjust pH to about 7.35.

IV. Comparative Study

[00025] A mascara composition containing polyamide as the emulsion gelling agent, substantially as described in Example II, is prepared and tested. A study is conducted in cool and warm climates for a period of 27 days. In the cool climate, 32 panelists are selected and are women ages 18 to 65 years old. The panelists wear conventional mascara at least 5 days per week and desire a mascara product that applies smoothly and feels comfortable. The panelists are instructed to use either the mascara of the present invention or a leading brand of mascara at least once a day. They are permitted to apply the mascara as often as they deem it to be necessary and/or desirable. However, they are to apply the mascara as they would apply their normal mascara. To remove the mascara the panelists are to use any normal eye makeup remover that they would ordinarily use.

[00026] At the conclusion of the study, panelists complete a self-administered questionnaire. Results of the study indicate that panelists who used the mascara of the present invention like it much more than the brand of mascara they normally use by 3 times more panelists who use the leading brand of mascara in the category of not clumping on the brush, separating the lashes, and curling the lashes. With respect to comfort on the lashes, defining the lashes, and the amount of color deposited to the lashes, 4 times as many panelists who use the mascara of the present invention like it much more than the mascara they normally use than panelists who use the leading brand of mascara. Finally, from the results of the study, 5 times as many panelists who use the mascara of the present invention than panelists who use the leading brand of mascara also indicate that the final appearance of lashes after application is liked much more than the mascara they normally use. Therefore, this study demonstrates the ability of incorporating the polyamide as a gelling agent for an emulsion in a mascara composition and the beneficial results obtained therefrom. The mascara of the present invention is non-tacky, therefore, it does not clump on the brush, and is comfortable when applied. Further, after the mascara of the present invention dries, the lashes appear nicely separated and defined, and have an overall appealing look that is preferred more than the leading brand of mascara.